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FACTORS DETERMINING THE INTEREST RATE

SUMMARY

Introduction. Factors to be considered, 445. — I. Time preference in a static society, 447. — The effect of invention on the interest rate, 447. — Economic expansion caused by invention, 449. — Time preference and a constructive attitude, 450. — The "price" of capital supply, 451. — II. The mechanism of finance, 454. — The interaction of gold and price levels, 455. — The effect of credit inflation, 455. — Discount and interest, 458. — Recent inflation, 459. — Conclusion, 461.

By way of apology for presuming to discuss a subject as venerable as that of interest, it may be urged that recent financial experiences have thrown a new burden of proof upon established doctrines. Not only the immediate determination of a market rate, but the relation of the rate to bank discount and to inflated price levels, has assumed a new importance. This paper does not attempt, however, anything so ambitious as a reforming of theories: in a general way the Austrian psychological concept is assumed as a foundation. The purpose is, rather, to attempt to show the correlations of the major factors determining the interest rate.¹

The discussion will be confined, in the main, to pure interest — the net payment to capital as such — which constitutes the substance of the actual rates appearing

¹ These correlations as they appear in the business cycle are susceptible of mathematical expression, but such a refinement of method was not thought necessary in connection with this paper. The correlations that could be so stated are entirely obvious from an inspection of business data, and are not in dispute. They may be seen, for example, in the Brookmire Barometer Charts, the Babson Reports, or less conveniently in the financial diagrams published by the National Monetary Commission. A very complete study appears in *The Review of Economic Statistics*, January and April, 1919.

in the market.¹ It is, of course, assumed that a variable premium for risk is usually present, with which may be included a premium or discount for anticipated changes in the price level. The charge for placing an investment — an item which has so much to do with the inequalities of rates as between urban and frontier regions — will be taken for granted. Other lesser influences will also be slighted, and attention will be centered upon the following: First, the so-called "time-preference" rate — the psychological attitude toward securities as contrasted with more immediate goods.² Second, the marginal investment rate, by which is meant the productive results in terms of interest arising from newly applied inventions, and other expansions of properties. Third, the bank discount rate — the usual control of currency inflation. Fourth, the actual price level — the ratios at which commodities exchange for gold as measured by adequate index numbers. Fifth, the theoretical price level, or that level which, under the conditions of the market then obtaining, would be necessary to maintain in equilibrium a gold monetary reserve. These factors may be summarized as saving, investment, inflation, and prices. It is assumed that these are the vital forces involved in the determination of the interest rate.

I

The force of time-preference may be seen most easily if we assume the case of an entirely static society. In such a society landed properties on which interest incomes are based will be held firmly in hereditary pos-

¹ Interest is here used to cover all incomes that may be considered as belonging to actual or potential investment in negotiable property, from real estate to personal notes. It therefore includes that portion of an enterpriser's profit which in strict accounting should be entered as interest on his holdings. It even includes wage surpluses when they have been definitely pledged. Bank discount is, of course, a form of interest, but it may be contrasted with other forms because of its relation to deposit currency.

² F. A. Fetter, *Economic Principles*, Pt. IV.

session, but they will be mortgaged and sometimes alienated by spendthrift or unfortunate families. The market rate will be determined as a resultant of the opposed consuming and saving propensities. A low rate will therefore be indicative of effective thrift, and of a low relative valuation placed upon immediate consumption as compared with future incomes. Exceptions might be noted in such a case as the spending of capital on scientific research, but this would imply a transition to a dynamic condition.

While time preference is always present as doubtless the most fundamental factor in the determination of the interest rate, yet the antithetical effect of dynamic conditions must be given much weight, particularly in modern times. Since the theoretical question involved is one over which there has been much dispute, it may be well to introduce the matter with a precise illustration.

Let us suppose that in a system otherwise static, there appears a markedly efficient invention calling for the installation of a new type of factory machine. Shares are issued representing the expected increase in property values, and are sold to secure the needed capital. These shares constitute an addition to the income-bearing properties already on the market. Unless there develops an abnormal impulse toward saving, the interest rate therefore rises, expressing the lower valuation placed upon the increasing properties. The case is simply that of increasing supply and lowering price, the rate being the reciprocal of the valuation of properties of estimated income-bearing power.

The anticipated earnings will next be tested by the actual productive power of the machine. To make the case extremely simple, let us suppose that the machine is made of the same materials that would have gone into

the direct goods displaced by the saving. Aside from a small degree of friction involved in transferring capital and labor to the new channel of demand, the market would be scarcely disturbed up to the time when the new machines came into operation. Then a readjustment would occur, out of which the businesses using the new machines would show a certain volume of new interest income above all costs of upkeep. This income, compared with the cost of the machines, would constitute a temporary productivity rate. A certain quantity of present goods would have been actually converted into a definite continuous income. It is to be observed that the materials and services used in making the machines are not valued primarily in terms of their capitalization, but in terms of their alternate use as direct goods. When the materials saved are of a different sort from those invested in machines there would be some readjustment of values, but the principle would hold. The cost of the machines would be alternate and equal to the cost of direct goods given up, and on this cost the temporary productivity rate would be based. If the rate proved to be high, there would be an active bidding for more capital to install more of the machines. This process would go on, with a high interest rate meanwhile ruling, until increasing costs of production and decreasing prices of output brought the earnings on the last increment of capital down to the current market rate. If no further inventions occurred both the interest rate and the average wage, which would have been bid up by the activity of enterprisers, would at length subside to approximately the old levels.¹

¹ Some inventions are simplifications of apparatus and may decrease the volume of equipment. Yet there still remains an investment cost from which a temporary productivity rate might be computed. When the saving is effected entirely through changes in the method of work, a question of wages rather than interest is involved. But the relation between the wealth income and the labor income is very close. In a final sense, all income is really both, arising from the interaction of man and nature. The use of machinery is simply a change in the mode of laboring. The ascribing of income to subjective

Modern societies are highly dynamic, both from the standpoint of intensive invention and extensive growth by foreign trade and investment. Hence the influence of business enterprise on the interest rate assumes an importance second only to that of time preference. Dynamic conditions arise primarily from the growth of mentality, accompanied as it usually is with a changing social attitude and habits of industry and thrift. Applied science is, then, the cutting edge of progress. As science becomes embodied in machinery, it tends to raise the interest rate; but a completion of the impulse of growth is likely to be marked by low interest again, unless habits of thrift have decayed. When an area thus highly developed comes into trade and investment relations with a more backward but potentially rich community it experiences a reflex of further growth, affecting favorably the earnings of both capital and labor. Hence a well developed area, like England for example, becomes the center of a progressive wave of dynamic growth, marked at the growing frontier by high interest rates, and in the older center by low interest rates. National systems of this sort, clashing in undeveloped areas, are likely to give rise to imperialisms.¹

One or two points of criticism of current ideas about interest remain to be noted at this stage of the discussion. The first of these is the common tendency to confuse time preference with a more fundamental constructive and sacrificing attitude toward future incomes. The

or objective causes arises from comparison, expressing the relative amounts which under given conditions differing units of labor may produce, or the relative amounts of production of similar labor with different agents of production. With static conditions and diffusion of knowledge, surplus income tends to inhere principally in landed properties, through the leveling effects of competition and the pressure of population. But it may inhere also in individual knowledge and skill. While wealth incomes are the ones usually capitalized and sold, labor power is susceptible of hypothecation, and loans are sometimes made on its security alone.

¹ The writer has attempted to sketch the historic workings of this economic tendency in a recent number of the National Social Science Series, entitled *National Evolution*.

time preference with which interest theory is concerned is an individual choice, which appears in the market principally as a demand for equities in property. The interest rate which is evolved reveals little about the real attitude toward the future. Thrift, in the negative sense of saving, tends toward the production of a low rate, while the constructive ability which produces useful inventions tends immediately toward a high rate. Yet both are aspects of the same forward-looking attitude.

It hardly needs to be pointed out that the inadequacy of the interest rate as a measure of a forward-looking attitude lies in the fact that a negative rate is impossible as a market condition, while a lower valuation of the present as compared with the future is quite possible as a psychological fact. The impossibility of a general negative rate arises primarily from the fact that the capacity for saving is always limited to a somewhat narrow margin of luxury spending. It is evident that the substance of present spending — all that could be properly included in real cost of living and in upkeep of properties — is as much or more a measure of future valuations as of present, and so could not be affected by a lessened time preference. Also, as to the value of capital properties, while it is true that the cost of machines and other equipment of indirect goods cannot rise markedly above the level of direct goods of equivalent materials and elaboration, yet the land which forms the basis of all productive properties may be bid up to any level that intensive saving may make possible. But capitalization would have to be driven up to infinity before even a zero interest rate could be produced. Hence, as between a limited saving capacity and an unlimited possibility for capitalization, a negative interest rate becomes impossible. Of course a negative rate in the sense of occasional losses may sporadically appear.

But, on the other hand, a psychological attitude of subordination of present to future may undoubtedly rule. The general attitude in progressive frontier communities is commonly that of entire absorption in the future, for which every sacrifice will be endured. If the interest rate were in a fundamental sense a measure of the preference of present over future, then a negative interest rate would prevail. But since the absorption in the future expresses itself in the production and purchase of all available equipment for the growing properties, a high preference for present goods appears to be reflected in the market interest rate. The rate in such a case is evidently a result of the earnings of dynamic investment, as already discussed. Later, when static conditions rule and luxury spending has perhaps begun to appear, the interest rate may again be low. If the society becomes decadent, interest may again be high, as in the period of maximum progress.

A question may also be raised as to the advisability of designating the interest rate as the "price" of capital loans. The term is appropriate in the case of bank credit but much less so in the case of saving and investment. To begin with, capital in the concrete is a relatively permanent investment, however much it may assume the shape of loans to individual investors who are shifting their capital. It therefore seems more logical with respect to the bulk of investment to apply the term "price" to the reciprocal of the interest rate — the "year's purchase," as it is expressed in England. From this point of view investment is the purchase of incomes, or perpetual annuities, as in general they may be termed. The interest rate is the reciprocal of the figure at which such a unit annuity sells, e. g., a five per cent rate means that a dollar income costs twenty dollars. This inversion of the term "price" in connection with capital may

seem a mere technicality, inasmuch as either side of a trade may theoretically be considered as price, and in this case both sides are expressed in terms of money. But a useful application may appear when the ordinary supply curve for capital loans is redrawn as a demand curve for annuities. It will then be seen that a somewhat inelastic curve may indicate a falling off of the volume of capital supplied (rectangle of coördinates) as the price falls; that is, as the rate rises. That such might be the case has often been suggested from a consideration of the fact that high interest calls for less saving in the attainment of a given income; yet on the contrary it has been held to conflict with the usual law of supply and demand. To be sure, the facts cannot be determined *a priori*; perhaps the curve of annuity demand is very elastic. But at least the method of statement here suggested avoids the theoretical assumption that high interest must necessarily mean correspondingly increasing volumes of immediate capital supply. And we may now reduce our statement of the interest rate to the formula that it is the reciprocal of the price of annuities — a price which fluctuates with the supply, as increased by business enterprise, and the demand, as determined by the practice of saving.

Viewing industrial society as an organization for producing goods and annuities — the latter being relatively perpetual and inheritable — serves to set forth the more fundamental nature of interest. The major portion of the interest income may be described as the surplus output from more productive or better situated agents of production — principally equipped real estate — above the labor and material costs of production.¹ Normally,

¹ Ordinary commercial borrowing may seem to be outside the range of this statement. Yet it may be considered as a temporary investment in the exchange phase of production, or as a renting of gold and its credit representatives. Borrowing against labor incomes is still less tangible. But in every case a present claim upon income is exchanged for a future claim, the basis of which is a durative agent or agents of production.

the amount of capital improvement is such as to equalize the interest rate at the margin of investment — the earnings of contemplated further improvements as already discussed — and to give a similarly uniform wage within each grade of labor. Interest is, then, typically a generalized expression for rent, and is inherent in the productive process and in the physical variations of land. The communist advocacy of its abolition is therefore somewhat chimerical.

There remains, however, some point to the theoretical criticism upon the private absorption of the interest income, particularly when the recurrence of more static conditions has brought low wages and leisure classes. Socially it is difficult to rationalize the fact that, even in so dynamic a country as our own, to judge from King's estimates, there must have been paid out as interest in 1910 (including profits going to capital as such) some ten or twelve billions of dollars, while scarcely more than three billions were being added annually to capital values. Apparently if society could so organize itself as to avoid the practice of paying people to save, it would be better off. Earlier stages of growth might be slower, but at least the future would not be mortgaged to a hereditary class. But such reasoning is futile. It overlooks the fact that society is not based on collective intelligence, but on instinct. The instinctive passion for the supremacy and freedom that wealth accumulation brings to oneself and heirs is ordinarily a dominant motive of mankind. Hence we may expect that for a considerable time to come, there will continue the historic rhythm of dynamic and static periods, with their alternating democratic and aristocratic swings, and the accompanying group competition and international friction.

II

We have attempted to show that the rate at which interest incomes are capitalized is a resultant of the interaction of the demand for established incomes, and the rapidity with which invention makes possible the improvement of income-yielding agents. But in the determination of the actual market rates the mechanism of finance is of great importance. A rate of three per cent a day, for example, which has at times of crisis appeared in financial centers, is evidently not a product of normal time preference nor ofventional progress. It is a measure of some sort of stringency arising out of a jamming of the financial machinery. We must turn, then, to a brief consideration of the problem of bank discount and price levels.

The function of gold as a medium of exchange will require only a passing mention. It is a truism that price levels on a strict gold basis are an inverse expression of the value of the basic metal, which has a commodity use as well as a monetary use. High price levels express a cheapening of gold, stimulating its use in the arts, and checking its production, unless more efficient mining processes have been adopted. Low price levels, on the other hand, make a bid for gold by offering more goods for its production. Allowing for certain shifting factors, such as changes in the volume of business and in the customs or laws determining private and banking stocks of money, it may be said that a normal price level is one which draws in and holds the amount of gold that can be maintained in equilibrium as the basis of exchange. About such a norm the price level of a gold economy will fluctuate. A surplus of money bids up prices, and abnormal prices react to drive out gold. A consequent re-

versal to low prices draws in gold, which in turn restores prices. This statement holds even after allowance is made for the complicating effects of credit currency. The marginal cost of producing gold will therefore tend to equate with its value, both in the arts and in circulation.

But a purely gold circulation is hypothetical. For reasons of convenience and economy there always exists a demand for credit representatives of the standard unit. Into the circulation of the basic currency is injected a flood of credit, of which the bank check is the most flexible and ubiquitous type. Government paper has a more authoritative acceptability, but is of somewhat the same nature, except that it may be pushed beyond the limits of convertibility, and that, as reserves, it constitutes with gold the required foundation for bank credits.¹

It appears both theoretically and experimentally that the injection of credit instruments into a commerce based on gold will have the same effect as the sudden appearance in the circulation of so much more of the metal. Prices will be driven up, and gold will eventually be pushed out into the arts, and its production checked. A part of this outflow will, however, be absorbed by the increased stocks of the cheapened money, and by the demands of a heightened volume of business. Also, if the inflation is limited to a given area, an unfavorable balance of trade will quickly bring about an export of the gold reserves. But, in spite of such limiting factors, it is conceivable that credit inflation may proceed to such a degree as to drive practically all the gold into the

¹ No definite percentage of bank credit to money appears to be necessary or inevitable. The ratio is established by custom or legislation at such a point as is felt to be safe in view of possible fluctuations in demand for reserves. But changes in such customs or laws have important effects, and sometimes permanent effects, the immediate consequence being that they either throw a surplus of gold upon the market or draw a quantity away, and so produce a temporary inflation or deflation until a new equilibrium is established.

arts. Indeed, when backed by the authority of government, credit issues may be forced beyond the metal basis altogether. Yet, if issued with caution by a responsible government, they would apparently maintain a value determined by their monetary use. Together with the bank credits legally based upon them they would measure the volume of business. In terms of this volume and of the velocity of circulation, each unit of the currency would automatically come to define itself.¹

We are, however, more concerned here with bank inflation, which will have certain sharp limits not felt by a government. A bank cannot easily repudiate convertibility. It cannot, therefore, push the issue of deposit currency to a point that will wipe out its coin and legal tender reserves. The degree of inflation will be controlled principally by a raising or lowering of the discount rate. What, then, are the factors determining the point at which the discount rate will come to an equilibrium?

It can be shown theoretically that the point of equilibrium about which the discount rate will fluctuate, will be the market interest rate as determined by forces of capital supply and demand already discussed. For if banks underbid the current rate they are eagerly drawn upon for deposit currency, because of the additional profit that may be made in the expansion of business and in the speculative purchase of properties. A continued low rate — low with reference to the standard inherent in actual business conditions — would therefore cause a continued rise in prices and an eventual loss of reserves. Since deposit currency is in effect commercial paper with a bank endorsement, it may be seen that such inflation would constitute a virtual debasement of the currency,

¹ Cf. R. G. Hawtrey, *Currency and Credit*, chap. iii; also Edwin Cannan, *Money, and J. S. Nicholson, Inflation.*

since a low interest note, however well secured, is not really worth its face value. The banks cannot, therefore, maintain a low rate, but will be forced to protect their paper and reserves by changing to a high rate, which in turn will cause deflation. Deposit currency will be cut down, with a corresponding lowering of prices and drawing in of gold. This process will, however, reverse itself when a reserve has again accumulated, since the banks cannot afford to let surplus reserves lie idle. Nor can they long restrict the currency by a high rate without attracting competitors into the field. Because of the resulting fluctuation of discount about interest, the former shows several times the range of variation that is shown by bond yields.

A complication in connection with the demand for deposit currency arises from the fact that there are really two price levels, a primary one of commodities, and a secondary one of properties. So far as the effect upon gold is concerned, it is apparently the commodity level that is the most important, but the property level has also some bearing in that its rise makes an added demand upon the medium of exchange. These two levels are related by the interest rate, since properties are capitalized in terms of their anticipated income divided by this rate.¹ When therefore a general lowering of interest takes place, property values soon show a marked increase in volume. As this usually occurs after a period of conservative saving, when business enterprise is reawakening, considerable bank inflation is then evidently justified; but it is easily overdone, because the fundamental conditions shift. The recurrence of high interest deflates property values, decreasing the demands upon currency, and rendering insecure some of

¹ In a minor degree the changing interest rate may affect the value of any relatively durative commodity, since future uses are theoretically discounted in present prices.

the mortgages placed at the earlier period. The result is an unavoidable intensification of the inflation swing.

Bank discount stands at the focal point of commerce where the more fundamental price and interest levels meet and interact. Its strategic position has been most conspicuously illustrated in the functioning of the Bank of England in pre-war times. The management of this bank enjoyed an exceptionally high prestige because of its exact knowledge of business conditions and its close relations with other banks. When it raised its rates, therefore, other banks followed suit, business contracted, exchange was modified, and gold flowed in. Because of London's dominating position in world trade, the effect was felt everywhere. When reserves had accumulated satisfactorily, the rate would be lowered, and gold would go out. With such movements of bank discount, business cycles are closely related.

When viewed from the standpoint of its effects upon business activity and price levels, the power to set the central discount rate appears like the act of an absolute monarch. Yet the appearance is deceptive, for the power necessarily has very narrow limitations. The discount rate must reflect fundamental conditions, or it will defeat itself. The belief somewhat prevalent today that price levels may be controlled by the rediscount rate of the Federal Reserve system has only a partial foundation in fact. Assuming that the central rate could control the local rates, one might expect that an alert and delicate control would lessen the fluctuations of prices, but it could not reach the causes determining the trend.

The financial situation now obtaining in Europe and America may be referred to briefly by way of illustration, tho the details lie outside of the scope of this paper, which has essayed merely a statement of certain prin-

ciples. It is, of course, a patent fact that in varying degrees Europe is suffering from extreme inflation. Even conservative England has found it necessary to enforce rigid laws against the export or conversion into bullion of gold coin, which has gone to a considerable premium, as is partially revealed by the state of the exchanges. The situation to begin with was the outgrowth of the sudden demand for goods needed to support the war. Commodity gold was naturally cheapened, leading to a falling off of demand for it, and in fact to the melting of a certain amount of plate for banking purposes. The tendency toward inflation was intensified by the withdrawal of gold from circulation into reserves, by low discount rates, and by government issues of virtually inconvertible paper. Much of the cheapened bullion moved to neutral countries, carrying with it a wave of high prices.¹ The large amounts coming to the United States in payment for war supplies became the basis of a credit inflation, which was augmented by the laxer provisions of the Federal Reserve system as regards reserves. Yet we have remained upon a metal basis in spite of the soaring prices, which apparently were inevitable as a consequence of the war-cheapened gold, the scarcity of certain goods, and the change in the banking basis.²

That a natural reaction to lower prices will set in is indicated by the lessening of gold production, by the increased use in the arts, by recent exports to the Orient and elsewhere, and by the consequent lessening of reserves.³ The rediscount rate has therefore recently been

¹ There was, however, a brief period at the opening of the war when gold flowed into England because of the sudden cessation of the discounting of foreign bills of exchange, and the checking of other investments affecting the exchange rates.

² A very pointed statement of the inflation process and its consequences in the United States is that appearing in the publications of the Bankers' Statistical Corporation, January and February, 1920, by Professor E. W. Kemmerer.

³ *Annalist*, February 16, 1920, p. 246.

raised, and will probably go higher, since reconstruction work will produce a high rate of interest. Whether the rediscount rate will control the general credit rate remains for the experts, or experience, to determine.¹ As conditions gradually become more normal in Europe, it may be expected that commodity gold will move somewhat toward its old level, or rather toward the level indicated by the rising trend that begun about 1896. The greatest obstacle lies in the strained and impoverished conditions of Europe — conditions that may be materially relieved by further extensions of American credit.

Since bank inflation is so intimately connected with fluctuations in price levels, it must evidently be taken into account in any comprehensive plan for the stabilizing of the measure of value. Doubtless business cycles are initiated by natural and psychological conditions affecting the commodity value of gold, such as changes in the relative cost of production of goods and gold, and the abstemious or extravagant moods of the public. But there is no doubt also that they may be greatly modified, either favorably or unfavorably, by banking methods. In regard to the widely discussed plan for a compensated dollar, it may be observed that it is aimed at forces affecting the trend of prices rather than the fluctuations, tho its effect upon bank inflation would probably be favorable in hastening the reaction. Other plans for controlling the trend of gold are possible; for example, a government monopoly of gold production, which could be made effective if England and America should coöperate.

¹ The Bankers Magazine (January, 1920, pp. 8 ff.) assumes that such control can and should be exercised. Hawtrey also takes the same position, on the basis of English experience. But it may prove that additional checks in the way of restrictions and penalties will be found essential to an adequate control of inflation. Since the funds secured by rediscounting may be multiplied in the form of loans, a comparatively high rate is not necessarily effective.

But whether or not any practicable plan can be introduced for controlling the basic unit, there is no question of the immediate advantage of a centrally controlled and closely articulated banking system. With such a system thoroly worked out, it might be possible eventually to control price levels without reference to any basic metal, through the regulation of a primary credit currency and the discount rate in conformity with a price index and current interest demands. At least, such a possibility may be deduced from the quantity theory. But the problem for the present is the gradual improvement of the Federal Reserve system, and the education of the public to a clearer comprehension of the functions and limitations of banking.

The effect of the mechanism of finance upon interest rates may be summarized as follows. Discount normally coincides with interest, but it fluctuates more widely than does interest, and attracts the latter somewhat from its course. When discount is lower than interest, deposit currency increases, prices tend to rise, and gold reserves to be reduced. When discount is higher, the opposite tendency obtains. The degree of consequent fluctuation of discount and prices depends upon the centralized efficiency of banking control. It is, however, only to the extent of these fluctuations — allowing for certain minor shifts occasioned by law and custom affecting reserves — that discount may be said to control prices. Fundamentally, interest depends upon time preference as modified by productive progress, and price levels depend on the relative valuation placed upon the standard metal as against goods.

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